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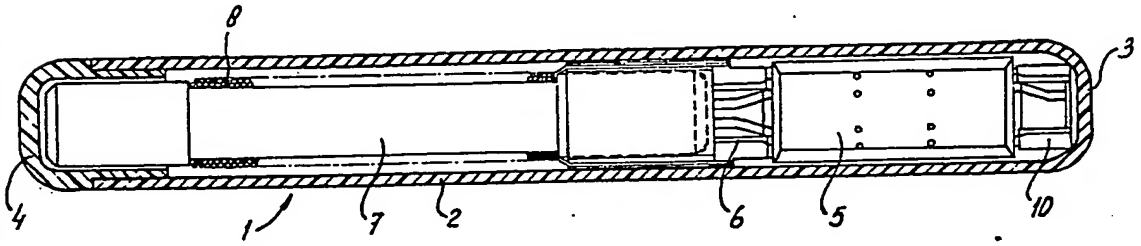
(54) Transponder and method for the production thereof.

(57) Transponder (1) to be implanted in an animal comprising a plastic holder (2, 3, 4) containing an electrical element (5) and a transmit/receive unit. The space between the element (5), unit respectively and the holder (2) is filled with a plastic material having ion barrier properties.

Fig-1



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Transponder and method for the production thereof.

The invention relates to a transponder to be implanted in an animal comprising a plastic holder containing an electrical element and a transmit/receiver unit, wherein the space between the element, unit respectively and the holder is filled with another plastic material.

Such a transponder is known from FR-A-2,604,601. Using of glass holders in transponders has the drawback that it is always possible that such a transponder will give injuries at breaking either in the animal in which the transponder is introduced or to the person consuming the meat of the animal. Because of this glass transponders have not yet successfully been used in animals for consumption. Because of this it has been proposed to use transponders having plastic holders. Although with this kind of transponders the danger of sharp glass particles are obviated, the problem arises that plastic is never 100% moisture proof. This means that moisture will ingress in the transponder itself and gives rise to premature failure of the electronic components because of corrosion. Because of this transponders having plastic encapsulation of the electronics could only be used for a relatively short service life. The polypropene resin described in the French patent specification does not give any improvement in this regard. It is also known from US-A-4,065,753 to use polyester material. However, this kind of material does not adhere sufficiently to electronic units giving a gap between them also resulting in premature failure because of corrosion.

The invention aims to obviate these drawbacks.

This aim is realized in that said other plastic material comprises a plastic having ion barrier properties. It has been found that it is not important to stop the water from reaching the electronic units to prevent corrosion, but that it is of importance to stop diffusion of ions through the plastic encapsulating material. Water in itself does not promote corrosion. It is the combination of water and ions which make an agressive solution. It has been found that polysiloxane material is an effective barrier against ions. During tests it became clear that even if an electronic component encapsulated with polysiloxane material is kept in a brine solution no ions will diffuse to the electric units.

In order to ensure better adhesion to the organism to which the transponder is implanted and to also ensure that the material to be introduced together with the transponder will remain at its surface as long as possible, the holder is provided with a certain surface roughness on the outside. Material to be introduced at the outside of the transponder together with it is e.g. Betadine having a beneficial influence during introducing of the transponder. Although for most electronic units the presence of only water is sufficiently to prevent failure this is not generally true if a ferrite core surrounded by windings is provided as the transmit/receive unit. In this case the ferrite core can be further protected by impregnation with wax. Since in practice the length of the transponder is less important than its diameter, a particularly advantageous arrangement is obtained if the axis of the transmit/receive unit essentially coincides with the axis of the electrical element. This means that no special dimension need be selected for the electrical element, so that a standard IC housing will suffice. In order further to limit the dimensions of the transmit/receive unit designed as a ferrite core with windings, the ferrite core is designed as a cylindrical bar provided with recesses between the ends to take windings. Surprisingly, and contrary to existing expectations, it was found that no short circuiting of lines of flux occurred here, and the ferrite core was found to function in the optimum manner while its diameter decreased.

The invention also relates to producing of a transponder comprising filling of the holder with polysiloxane material and introducing of the element/unit by reduced pressure. This method is on the one hand very effective to prevent gas to be entrapped between the polysiloxane material and the electronic units and is on the other hand easily to realize.

The invention will be explained in greater detail below with reference to an example of an embodiment shown in the drawing, in which:

Fig. 1 shows a top view in cross section of the transponder according to the invention;

Fig. 2 shows a side view of the transponder according to the invention; and

Fig. 3 shows in cross section a detail of the ferrite core shown in the transponder in Figs. 1 and 2.

Fig. 1 shows a transponder indicated in its entirety by reference number 1. It comprises a plastic tube 2 with bottom 3, shut off at one end by a cap 4. The tube 2 contains an electronic element 5 such as a chip connected by means of connecting wires 6 to both the windings 8 of ferrite core 7 and capacitor 9 (see Fig. 2). At the other side, electronic element 5 is connected to capacitor 10, and a few other wires are free for connection to a programming device. As shown in Fig. 2, the electronic element 5 is supported by a carrier 11. For positioning, apertures 12 are provided in the carrier 11, in which legs 13 of the electronic element 5 are placed. Before the insertion of the ferrite core 7, it

is impregnated with wax, together with the windings 8. This is to prevent its action from changing during operation due to moisture absorption through the plastic tube 2.

According to the invention, tube 2 is made of plastic because this ensures better adhesion to the body of the animal. In order to promote this adhesion, tube 2 and cap 4 are also provided with a certain surface roughness. The impregnation agent, wax, is not shown in the drawing. After insertion of the ferrite core and the electronic element 5 and making of all the necessary connections, before the cap 4 is placed, polysiloxane material is inserted under vacuum conditions, in order to protect the whole unit from the effects of moisture. This polysiloxane material is not shown in the drawing. Plastic tube 2 and cap 4 are preferably made by injection moulding. On the one hand, this is extremely cheap to carry out and, on the other, it is thereby ensured that a sterile product is obtained immediately after the injection moulding. Through placing the electrical element lengthwise after the ferrite core 7, it is possible to make said element fairly large, so that - as can be seen clearly from the figures - a standard chip housing can be used. Such an arrangement is important because during the implantation in an animal, as described in NL-A-8703077, the opening in the skin of the animal must be made as small as possible, following which the length of the part to be implanted is less important, all this in order to prevent infections from injuries and the like as far as possible.

Fig. 3 shows a detail of ferrite core 7. As can be seen, this ferrite core is essentially cylindrical and provided with a recess 15. It was surprisingly found that, despite this recess 15, the functioning of the ferrite core 7 is just as good or even better than in the situation in which the windings 8 lie internally on the part with the largest external diameter indicated by 16. This is contrary to the preconceived ideas existing hitherto. Through the use of a standard chip housing, a free space is provided, in which the capacitors 9 and 10 are housed. Although the invention is described above with reference to a preferred embodiment, it must be understood that many modifications can be made to the transponder which lie within the scope of the present invention.

Claims

1. Transponder to be implanted in an animal comprising a plastic holder containing an electrical element and a transmit/receive unit, wherein the space between the element, unit respectively and the holder is filled with another plastic material characterized in that said other plastic material has ion barrier properties.

2. Transponder according to claim 1 wherein the other plastic material comprises polysiloxane material.

3. Transponder according to claim 1 in which the transmit/rereceive unit comprises a ferrite core surrounded by windings, which is impregnated with wax.

4. Transponder according to claim 1 in which the external surface of the holder is roughened.

5. Transponder according to claim 1 in which the axis of the trasnmit/receive unit coincides with the axis of the electrical element.

6. Transponder according to claim 1 in which the transmit/rereceive unit comprises a ferrite core with windings, the ferrite core being a cylindrical bar provided with a recess between the ends to take the windings.

7. Method for producing of a transponder according to one of the preceding claims, comprising filling of the holder with polysiloxane material and introducing of the element/unit by reduced pressure.

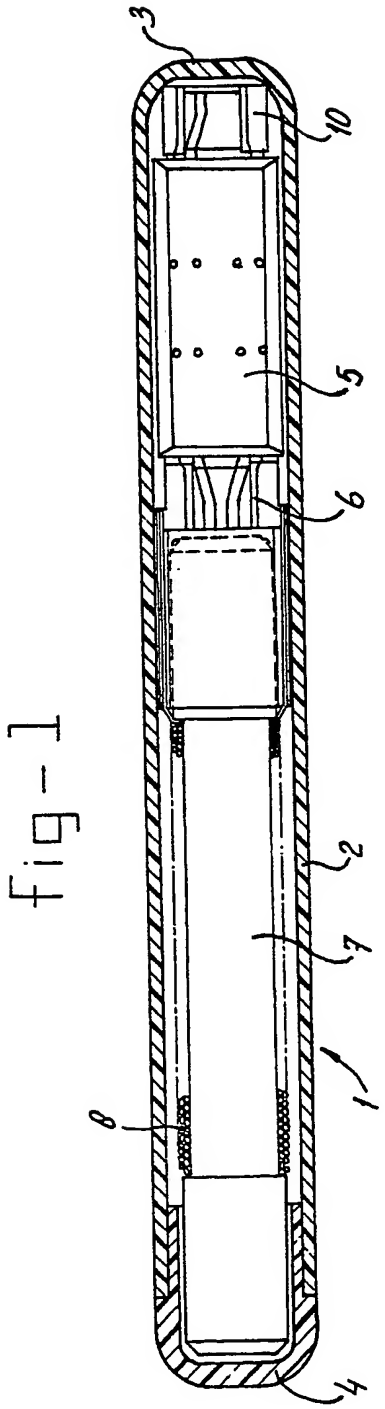


Fig-1

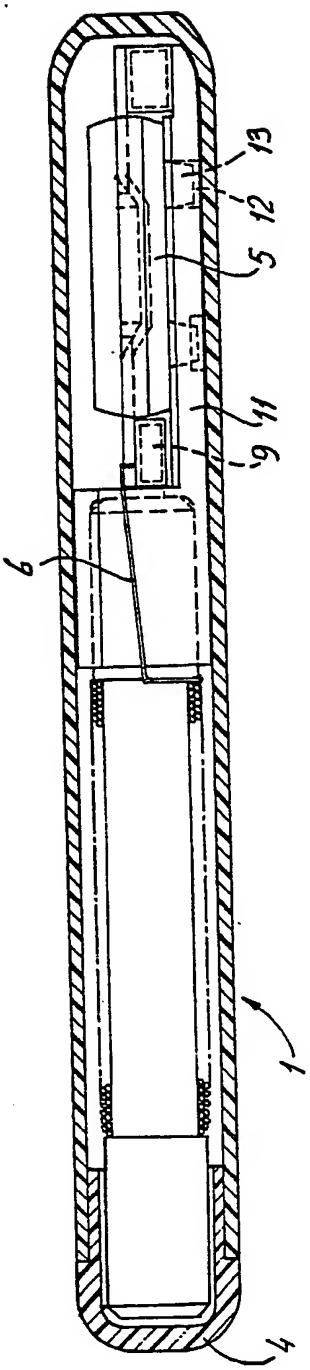
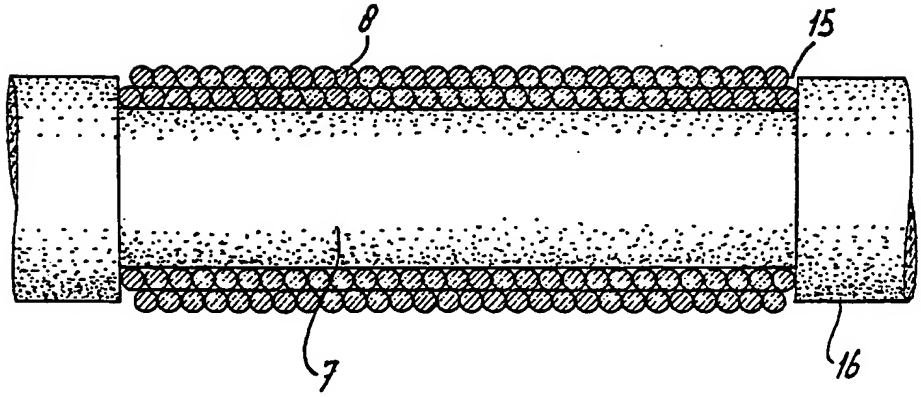


Fig-2

Fig-3



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EUROPEAN SEARCH REPORT

Application Number

EP 89 20 2553

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A,D	US-A-4065753 (PAUL) * column 5, lines 3 - 61; figure 1 *	1-3, 5, 6	A01K11/00
A,D	FR-A-2604601 (BIO MEDIC DATA SYSTEMS, INC.) * page 13, line 26 - page 14, line 11; figure 14 *	1, 2	
A	WO-A-8704900 (IDENTIFICATION DEVICES, INC.) * page 14; figure 4 *	3, 5, 6	
A	GB-A-2188028 (O'BRIEN) * the whole document *	5	
A	WO-A-8504551 (SEMPLE) * page 2, lines 7 - 20; figures 1, 2 *	5	
A	EP-A-0132102 (SMITHKLINE BECKMAN CORPORATION)		
P,A,D	NL-A-8703077 (TEXAS INSTRUMENTS HOLLAND B.V.)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

A01K
A61D
A61M

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	08 JANUARY 1990	VON ARX V.U.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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L : document cited for other reasons

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